The Financial Inclusion Index: Insights and Implications for G20 Countries

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Abstract

Financial inclusion (FI) ensures equitable access to and utilisation of quality financial services for individuals excluded from the formal financial system. The study constructs three multidimensional financial inclusion indices for G20 countries using supply- and demand-side indicators sourced from global databases, applying the non-parametric (Euclidean distance) method to provide a robust framework for analysis. These indices serve as a comprehensive, systematic, and coherent measure that consolidates financial inclusion into a numerical value, offering an insightful reflection of a country's financial infrastructure, institutional financial offerings and their utilisation. The findings demonstrate a consistent upward trend in financial inclusion across G20 countries across all indices. However, only a few countries attain consistently high scores across all indices and their dimensional indices. The research further reveals that developed countries outperform developing countries, primarily due to their superior infrastructure and advanced financial systems. Developing countries exhibit robust performance in the digital dimension, suggesting that, if leveraged effectively, these digital advancements could significantly enhance financial inclusion. For developed countries, the study recommends improving the quality of financial services while broadening access to digital financial platforms. In contrast, for developing countries, the research advocates prioritising investment in basic financial infrastructure, which would better address the needs of populations that remain underserved by formal financial services. The study recommends enhancing the supply of innovative financial services, particularly those leveraging digital platforms, to meet the evolving needs of users across all countries.

Keywords: Financial Inclusion; Developing and Developed G20 Countries; Supply and Demand Index; Cross-Country Analysis; Digital financial inclusion.

JEL Classifications: G21, G28, O11, O57, P52

1. Introduction

Finance has an indispensable role in individual and national development. Financial inclusion (FI) ensures equitable access to and utilisation of quality financial services for all. On an individual level, access to financial resources allows people to invest in education, healthcare, businesses, and other activities that improve their quality of life. It is best articulated by the UN's Building Inclusive Financial Sectors for Development report: "Access to a well-functioning financial system can economically and socially empower individuals, in particular poor people, allowing them to better integrate into the economy of their countries, actively contribute to their development and protect themselves against economic shocks" (United Nations, 2006). On a macroeconomic level, access to finance drives economic growth and development by enabling investments in infrastructure, industries, and public services. Therefore, financial inclusion is crucial for every individual and nation. "Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered responsibly and sustainably" (World Bank, 2017). An inclusive financial system fosters economic growth, social development, and financial stability by enhancing users' financial capabilities and efficiency, thereby reducing income inequality and poverty (Bhuvaneskumar et al., 2024; Fu & Yi, 2023; F. Liu & Walheer, 2022; Neaime & Gaysset, 2018; Timbi & Abdala, 2024; Wang & Guan, 2017).

In recent years, particularly since the 1990s, financial inclusion has attracted significant attention from policymakers and academia, driven by studies highlighting its essential role in promoting economic growth and development. More than 60 countries have formally adopted financial inclusion and access to finance as their developmental goal, backed by various organisations and institutions such as the World Bank and the International Monetary Fund (IMF) (Sahay et al., 2015; Sethi & Sethy, 2019). It is a critical element that makes growth inclusive, as access to finance enables economic agents to make longer-term consumption and investment decisions, participate in productive activities, and cope with unexpected short-term shocks (Park and Mercado, 2015; Van et al., 2019). Given its critical role in advancing various socio-economic conditions, FI is recognised as a key enabler or target for achieving 8 of the 17 Sustainable Development Goals (SDGs) established by the United Nations (UN) (Chibba, 2009; Fu & Yi, 2023; GPFI, 2023; Gutiérrez-Romero & Ahamed, 2021; Liu & Walheer, 2022; UNSGSA, 2018; Wang & Guan, 2017; Zheng et al., 2024) and set as the goal of Universal Financial Access (UFA) by the World Bank by 2020 and 2030 SDG by the UN.

It is essential to understand the level of financial inclusion of a country or a region because an accurate measure of FI shows the progress of the policy initiatives undertaken to promote FI

at a regional and global level (Beck, 2016; Sharma et al., 2021). Measurement of FI is also necessary to study its impact and to decide on the future course of action (Nguyen, 2021). The policymakers and the government machinery can develop and implement proper policies on financial inclusion only if the current status and past trends of financial inclusion are known. A good measure of financial inclusion should include three criteria: (1) ability to incorporate as many dimensions as practically possible, (2) simple calculations, and (3) comparability across countries (Van et al., 2019). The literature proves that the financial inclusion index is the best way to satisfy all these criteria. Numerous scholars advocate using a multidimensional index instead of a single indicator or a group of indicators, as it offers a composite and comprehensive measure of financial inclusion. This multidimensional approach captures financial inclusion's intricate and multifaceted nature more effectively than isolated metrics.

Researchers have attempted to construct financial inclusion indices using various indicators but restricted themselves to either supply-side or demand-side FI, and only a few studies considered combining the two. Most studies used only a few FI indicators, restricting their scope. Therefore, this study develops three multidimensional and multivariate financial inclusion indices that incorporate supply and demand FI variables, analyses the reasons for the high and low performance of their FII, and suggests policy formulation. The study takes up the developed and developing countries of the G20 to understand the current and past trends of financial inclusion in these countries and to find out the various factors influencing a country's financial inclusion.

The study developed three indices –Consolidated Financial Inclusion Indices (CFII), Supply-side Financial Inclusion Index (SFII) and Demand-side Financial Inclusion Index (DFII). The SFII assesses and evaluates financial services' availability, usage and effectiveness from the financial service provider's perspective. It focuses on the supply side of the financial inclusion landscape, examining the extent to which financial institutions and other entities successfully deliver inclusive financial services to various segments of the population. The DFII is a measure that assesses the extent to which individuals and households have access to and use financial products and services. It focuses on the demand for financial services from the perspective of the user or consumer of financial services. CFII is a metric that assesses FI by consolidating the SFII and DFII. The optimal financial inclusion measurement is obtained when supply- and demand-side variables are used in the measurement process. It provides a comprehensive snapshot of how individuals and businesses can access and utilise financial services that help to grasp the complete picture of the financial inclusion of a country. Using only either of the two variables may lead to biased conclusions. The study also develops dimensional indices and their ranking

for all the primary indices (mentioned above). Analysing the dimensional index is crucial for providing a nuanced assessment of the various facets contributing to FI. The dimensional index synthesises multiple indicators across dimensions, giving a more holistic understanding of FI.

The study contributes to the extant literature in the following ways. First, the study fills the research gap by developing separate indices for FI's supply and demand side, as other significant studies focused only on supply or demand side variables. These indices give insights into the countries' supply, demand, and overall FI, providing a thorough understanding. Second, the study unravels the reasons for G20 countries' FI performance, giving more insights into their policy formulation and advancement. Third, this study focuses on conventional and digital FI indicators, which are unaddressed by previous literature. Insights on digital FI can give an edge in future policy development.

The remainder of the paper is structured as follows: Section 2 presents the literature review, Section 3 describes the data and research methodology, Section 3 presents and discusses the study's empirical results, and Section 4 provides the policy implications and conclusions.

2. Review of literature

This section gives a comprehensive picture of the measurement of financial inclusion, the dimensions of financial inclusion and the research gap.

2.1 Measuring Financial Inclusion

Scholars have employed diverse methodologies to quantify financial inclusion, underscoring the importance of a theoretically grounded and mathematically robust metric, which is essential for accurately identifying barriers to financial inclusion and for effectively diagnosing, analysing, formulating, and evaluating policy interventions (Dircio-Palacios-Macedo et al., 2023). In the initial stages of financial inclusion research, most studies relied on a single indicator or a limited set of metrics to assess and explain the financial inclusion status of a country (Neaime & Gaysset, 2018; Polloni-Silva et al., 2021). These studies solely focused on the availability and accessibility dimensions of financial inclusion, defining it based on the accessibility and availability of financial services to the people. Studies such as these used single variables or multiple individual variables as proxies for financial inclusion, gave an incomplete picture and proved that financial inclusion is an expansive concept that cannot be adequately represented by a single variable (Dircio-Palacios-Macedo et al., 2023). They were a unidimensional approach, focusing on a single indicator or dimension rather than considering the holistic picture (Ayayi & Dout, 2024).

The literature advocates for developing an index that fully encapsulates the multifaceted aspects of financial inclusion within a country. The financial inclusion index is widely recognised in the literature as a comprehensive measure of financial inclusion as it incorporates multiple variables and dimensions into a single numerical value, which is comparable and often self-explanatory (Karim et al., 2022). This context highlights the importance of employing a composite index of financial inclusion. Using a financial inclusion index effectively consolidates all available indicators into a single measurement, offering a more accurate representation of a country's financial inclusion. Even though it has disadvantages like data availability challenges and subjectivity in dimension weighting, the multidimensional financial inclusion index is a valuable tool for assessing and benchmarking financial inclusion efforts globally. This method is superior as it incorporates different FI indicators and reduces them into a single value to avoid complexity and redundancy. Tram et al. (2023) highlight that multidimensional indices provide a better measure of financial inclusion, aiding in policy formulation and evaluation. However, using a composite financial inclusion index is not without criticism. Similar to other macro indices, it loses country-specific information due to the aggregated nature of the data (Sarma & Pais, 2011).

While the literature generally favours the advantages of using composite indices to measure financial inclusion over its drawbacks, there is no consensus on the optimal methodology for constructing such indices (Pesqué-Cela et al., 2021). Two methods are adopted to develop the FI index - parametric and non-parametric (Ayayi & Dout, 2024; Sha'ban et al., 2020). The parametric method uses statistical tools such as the Coefficient of Variation (CA) (Rojas Cama et al., 2024; Shen et al., 2021), Factor Analysis (FA) (Mialou et al., 2017), entropy method (Jin et al., 2024), Principal Component Analysis (PCA) (Cámara & Tuesta, 2014; Ezzahid & Elouaourti, 2021; Nguyen, 2021; Saha & Dutta, 2022; Sha'ban et al., 2020), Multiple Correspondence Analysis (MCA) (Bukari et al., 2024; Reis, 2021) and non-parametric method uses Euclidean distance method (ex. (Ambarkhane et al., 2016; Park and Mercado, 2015; Rojas Cama et al., 2024; Sarma, 2008, 2015; Sarma & Pais, 2011; Sethy & Goyari, 2022; Van et al., 2019). While several methods are available for constructing financial inclusion indices, none can be considered superior because each method has advantages and disadvantages.

2.2 Dimension of Financial Inclusion

The financial inclusion variables can be broadly classified into two- (i) supply-side and (ii) demand-side indicators (Geraldes et al., 2022; Koomson et al., 2020; F. Liu & Walheer, 2022; Mercado & Pontines, 2024; Sha'ban et al., 2020). Supply-side financial inclusion indicators pertain to the availability and accessibility of financial products and services offered to the

population by financial institutions and government entities. Conversely, demand-side financial inclusion indicators capture the preferences, behaviours, utilisation, and adoption of these financial products and services by individuals and businesses. Together, these metrics exemplify the extent to which financial facilities and services align with and satisfy the needs and preferences of the population.

The earlier literature on financial inclusion only considered access to financial inclusion, making it a unidimensional concept that excluded other dimensions like usage, cost, affordability, quality, and depth. Nevertheless, it is a multidimensional concept whose measure must capture all dimensions (Nyarko et al., 2023). The access, availability and usage dimensions are the three main dimensions used in significant studies which explain financial inclusion, giving a broader understanding (Beck et al., 2007; Jin et al., 2024; Nguyen, 2021; Park and Mercado, 2015; Sarma, 2008; Sethy & Goyari, 2022; Van et al., 2019).

Previous studies used various dimensions such as Access dimension (Cámara & Tuesta, 2014; Sha'ban et al., 2020; Wang & Guan, 2017), banking penetration dimension (Sarma, 2008, 2016), availability of banking services dimension (Park and Mercado, 2015; Van et al., 2019), depth dimension (Kodan & Chhikara, 2013; Sha'ban et al., 2020), barriers to financial inclusion dimension (Cámara & Tuesta, 2014), quality of financial services (Sharma et al., 2021) and usage dimension (Cámara & Tuesta, 2014; Park and Mercado, 2015; Sarma, 2016; Sha'ban et al., 2020). Digital technology has significantly enhanced financial inclusion in numerous low-income countries (Shen et al., 2021). Therefore, the digital dimension is also essential, as pointed out in many recent studies (Chinoda & Kapingura, 2024; Fu & Yi, 2023).

The literature lacks a consensus on the optimal dimension for measuring financial inclusion; however, there is a general understanding that incorporating a broader range of indicators and dimensions enhances the explanatory power.

2.3 Research gap

Most literature on financial inclusion relies on either supply-side or demand-side data to construct financial inclusion indices, with relatively few studies integrating both perspectives. Therefore, this study proposes to develop a financial inclusion index that depicts the supply and demand sides separately and a consolidated index that shows the overall financial inclusion of the countries. Furthermore, along with other dimensions, this study introduces a novel digital dimension—absent in prior literature—into supply-side and demand-side indices. These indices collectively depict the supply-side, demand-side, digital, and overall levels of financial inclusion for the countries under examination.

3. Data and Methodology

3.1 Financial Inclusion Indicators and dimensions

The data for developing the indices are taken from the IMF's Financial Access Survey (FAS) for the supply side and the World Bank's Global Findex Database for the demand-side data. The SFII was developed from 2004 to 2021, and the DFII and the CFII are from 2011 to 2021.

The study adopted 17 indicators as proxies to the supply and demand side of financial inclusion, and they are grouped into three dimensions - access and availability (D1), usage (D2), and digital (D3) dimensions. A dimensional index synthesises multiple indicators across dimensions, giving a more holistic understanding of financial inclusion. The dimensional approach to analysing financial inclusion provides a nuanced understanding of how countries perform across different aspects and identifies areas needing improvement.

Although the literature acknowledges various dimensions of financial inclusion, the access dimension remains foundational, emphasizing the need for inclusive and sustainable services. Though various literature denotes ‘access’ and ‘availability’ as separate dimensions, Access and availability are considered a single dimension in this study because accessibility is similar to availability and thus to avoid multicollinearity (Bozkurt et al., 2018; Saha & Dutta, 2022). Pesqué-Cela et al. (2021) defined the access dimension as the “availability or opportunity to use financial services”. Claessens (2007) defined access as the availability of financial services at a “reasonable cost”. Therefore, access and availability are considered a single dimension in the study.

The usage dimension (D2) encompasses variables that reflect the utilization of financial services and instruments. The third dimension, the digital dimension (D3), introduces a unique aspect to the study, as it has been largely overlooked in previous research. This dimension includes all indicators pertinent to digital financial inclusion. The digital dimension index is instrumental in understanding digital financial inclusion and is a crucial tool for measuring the levels of digital inclusion. Other dimensions, such as quality, cost and barriers dimensions of financial inclusion, are excluded from the study due to the lack of adequate data, as no quantitative information is available to accurately represent the quality, cost and barriers of financial services (Nyarko et al., 2023). All variables utilized in the study are detailed in Table 1.

Table 1: Financial Inclusion Variables in the Study

Sl. No	Variable Name	Dimension	literature

Supply-side Variables			
1	Commercial bank branches (per 100,000 adults)	Access and Availability (D1)	(Beck et al., 2007; Neaime & Gaysset, 2018; Sethy & Goyari, 2022; Sha'ban et al., 2020; Shen et al., 2021)
2	Automated teller machines (ATMs) (per 100,000 adults)		(Beck et al., 2007; F. Liu & Walheer, 2022; Neaime & Gaysset, 2018; Polloni-Silva et al., 2021; Sha'ban et al., 2020; Tram et al., 2023)
3	Number of commercial bank branches per 1,000 km^2		(Cámara & Tuesta, 2014; Sethy & Goyari, 2022)
4	Number of ATMs per 1,000 km^2		(Beck et al., 2007; Shen et al., 2021)
5	Outstanding deposits with commercial banks (% of GDP)	Usage (D2)	(Nguyen, 2021; Sethy & Goyari, 2022)
6	Outstanding loans from commercial banks (% of GDP)		(Nguyen, 2021; Sethy & Goyari, 2022)
7	Individuals using the internet (% of the population)	Digital (D3)	(Shen et al., 2021; Zheng et al., 2024)
8	Mobile cellular subscriptions (per 100 people)		(Honohan, 2008; Nyarko et al., 2023; Polloni-Silva et al., 2021; Shen et al., 2021)
Demand-side Variables			
9	Formal account Ownership (%)	Access and Availability (D1)	(F. Liu & Walheer, 2022; Park & Mercado, 2018; Shen et al., 2021; Wang & Guan, 2017)
10	Formal savings Account (%)		(F. Liu & Walheer, 2022; Mercado & Pontines, 2024; Nyarko et al., 2023; Park & Mercado, 2018)
11	Formal credit (%)		(F. Liu & Walheer, 2022; Mercado & Pontines, 2024; Park & Mercado, 2018; Shen et al., 2021)
12	Owns a debit or Credit Card (%)		(F. Liu & Walheer, 2022; Mercado & Pontines, 2024; Park & Mercado, 2018; Wang & Guan, 2017)
13	Used a debit or credit card (%)	Usage (D2)	(Park & Mercado, 2018; Wang & Guan, 2017)
14	Formal account deposit (%)		(F. Liu & Walheer, 2022; Park & Mercado, 2018)
15	Formal account withdrawal (%)		(Mercado & Pontines, 2024)
16	Used Mobile or internet to check account (%)	Digital (D3)	(Shen et al., 2021)
17	Made payment or received money digitally (%)		(F. Liu & Walheer, 2022; Mercado & Pontines, 2024; Wang & Guan, 2017)

3.2 Geographical Scope of the Study:

The study selects G20 member countries because their diverse composition offers a robust representation of global financial inclusion dynamics. The analysis includes 19 G20 member states, which are systematically categorized as either developing or developed economies based on the economic classifications provided by the IMF's World Economic Outlook – A Rocky Recovery 2023. The IMF's classification incorporates vital economic indicators, including GDP measured at purchasing power parity, total export volume of goods and services, and population size, accurately reflecting each country's economic development stage (IMF, 2023). Additionally, the countries are categorized by income levels into High-Income Countries (HICs), Upper

Middle-Income Countries (UMICs), and Lower Middle-Income Countries (LMICs), following the United Nations World Economic and Prospects (WEP) Report 2022. This report delineates countries based on their income levels. The study focuses exclusively on these three income-based divisions, disregarding other income classifications not pertinent to the sample.

3.3 Methodology

The indices are developed based on the Euclidean distance approach (proposed by Sarma, 2015, 2016; Yadav et al., 2021)**)**, as it satisfies essential mathematical properties such as boundedness, unit-free property, homogeneity, signalling, and monotonicity (articulated by Nathan et al. (2008)). Data aggregation is done using geometric rather than linear formulation as geometric aggregation is considered superior to linear aggregation as it accounts for substitution rates between subdimensions, characteristic of financial inclusion variables (Dircio-Palacios-Macedo et al., 2023).

Nardo et al. (2005) and Saltelli et al. (2006) proposed the steps for developing an index, which is followed in the study. Various steps are adopted to make the index more representative and complete, and they are explained below.

Step 1: Theoretical framework and data selection **-** Data selection is predicated upon a comprehensive literature review, ensuring robust theoretical underpinnings. The inclusion criteria for data are stringent, necessitating data availability for all countries under consideration in the study. Any variable for which data is unavailable for a specific country is excluded from the analysis. In instances where data is missing for particular years, advanced statistical techniques, such as the linear interpolation method, are employed to estimate the missing values, thereby maintaining the integrity and continuity of the dataset.

Step 2: Assignment of Weights to each dimension **-** The second step in calculating the index is the assignment of weights to each indicator based on their dimensional classification. Weights are a set of value judgements (Nardo et al., 2008)**,** as weights influence the results significantly. Chang et al. (2023) opined that the existing indices are problematic due to arbitrary weighting. In this study, weights are assigned based on the importance of the dimensions. In the literature, weights to the individual financial inclusion variables are assigned based on the author's intuition and logic or by using some statistical method such as PCA to assign weights objectively based on the indicator. However, these methods have disadvantages: low interpretability of coefficients and misleading and biased weighting (Dircio-Palacios-Macedo et al., 2023). Many authors have assigned equal weights to all the dimensions (Sarma, 2008), and others have given differential treatment to dimension weights (Sharma et al., 2021). Amidžić et al. (2014) criticise an index

that assigns uniform weights to all variables and dimensions, arguing that such an approach implies equal relevance of all dimensions in financial inclusion, which may not accurately reflect real-world dynamics. In this study, the weights are assigned differently to each dimension, considering the previous research studies and based on the importance of the dimensions.

Given that the access and availability dimension encapsulates the most fundamental and essential variables of financial inclusion, serving as the foundational aspect upon which all other dimensions of financial services rely, it is assigned a higher weight of '1'. In contrast, the remaining two dimensions are each allocated a weight of '0.5' to reflect their relative significance. Access to financial services does not imply usage, as people having accessibility to financial services can choose not to use them due to various reasons (Beck et al., 2007). Most studies have given predominant importance to financial access and availability dimension to other dimensions when studying financial inclusion (Ayayi & Dout, 2024; Ifediora et al., 2022; Leyshon et al., 2008; Leyshon & Thrift, 1995; Mitton, 2008). A significant reason for the lack of usage of financial services is the lack of accessibility to financial services (Rojas Cama et al., 2024). Therefore, the high weightage of the Access and Availability dimension is justified.

Step 3: Normalisation of the Variable values - The variable values are of varying scales, and normalisation is to be done on all the variables to bring the values to a standard scale (Nardo et al., 2008). There are various methods to normalise the data, such as ranking, standardization, distancing, categorical scale assignment, cyclical indicators, and Min-Max. In this study, each indicator value is normalised using the Min-Max method. Nardo et al. (2008) explain that the Min-Max normalisation could widen the range of indicators within a small interval, increasing the effect on the composite indicator more than the z-score transformation. During this process, weights are assigned to the variables based on their dimension. The normalised value lies within the '0' and 'w' range, where '0' is the lowest value, indicating no financial inclusion and 'w' represents the highest inclusion level. The weight of each variable is multiplied by the normalised value, making the value between the lowest point "0" and the highest point 'w'. The normalisation equation is given below.

$$\boldsymbol{IND_i = \mathrm{w}_i \frac{A_i - INDm_i}{INDM_i - INDm_i}} \qquad Equ\ (1)$$

The actual financial inclusion indicator value A_i is normalised using the Min-Max method with the equation (1). $INDm_i$ and $INDM_i$ are each indicator's minimum (or the lower) bound and maximum (or the upper) bound, respectively. The normalised indicator (IND_i) is given a weight (w_i) such that $0 \leq \mathrm{w}_i \leq 1$ to represent its relative importance. The w_i in equation (1)

ensures that the value $0 \leq IND_i \leq w_i$ such that it gives the value from the lowest point (Minimum value) and the max value 'w'.

Step 4: Construction of the Index - The normalised financial inclusion indicators are grouped into different dimensions and calculate the X_1 and X_2 values. X_1 is the normalised Euclidean distance between the actual dimensional value and the lowest point, and X_2 is the inverse Euclidean distance between the dimensional/indicator value and the weight as given in equations (2) and (3), respectively. Then, the simple average of the sum of X_1 and X_2 is taken to calculate the dimensional index values and SFII as in equation (4).

$$\boldsymbol{X_1} = \frac{\sqrt{\boldsymbol{IND_1^2 + IND_2^2 + \cdots + IND_n^2}}}{\sqrt{(\boldsymbol{w_1^2 + w_2^2 + \cdots + w_n^2})}} \qquad Equ\ (2)$$

$$\boldsymbol{X_2} = (\mathbf{1} - \frac{\sqrt{(\boldsymbol{w_1 - IND_1})^2 + (\boldsymbol{w_2 - IND_2})^2 + \cdots + (\boldsymbol{w_n - IND_n})^2}}{\sqrt{\left(\boldsymbol{w_1^2 + w_2^2 + \cdots + w_n^2}\right)}}) \qquad Equ\ (3)$$

$$\boldsymbol{FII} = \frac{\mathbf{1}}{\mathbf{2}}\ [\boldsymbol{X_1 + X_2}] \qquad Equ\ (4)$$

The countries are classified into three groups based on their index and dimensional index scores (Elgharib, 2024; Nandi et al., 2022; Nyarko et al., 2023; Sarma, 2008). These are High-FI countries with index scores above 0.6, Moderate-FI countries with index scores between 0.3 and 0.6, and Low-FI countries with index scores below 0.3.

4. Results and discussion

Three indices of financial inclusion are developed in the study. They are Supply-side Financial Inclusion Index (SFII), Demand-side Financial Inclusion Index (DFII) and the Consolidated Financial Inclusion Index (CFII).

4.1 Supply-side Financial Inclusion Index (SFII)

The SFII is developed using the supply-side variables of financial inclusion. It is a metric that assesses and evaluates financial services' availability, usage and effectiveness from the financial service providers' perspective. It focuses on the supply side of the financial inclusion landscape, examining the extent to which financial institutions and other entities successfully deliver inclusive financial services to various segments of the population.

Table 2 – Year-wise Supply-side Financial Inclusion Index (SFII)

Countries	Development Status	Income Status	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Mean	FI Status	Rank
Korea	Developed	HIC	0.688	0.691	0.696	0.700	0.691	0.696	0.698	0.706	0.711	0.713	0.713	0.705	0.701	0.700	0.710	0.717	0.716	0.603	0.697	**High**	**1**
Japan	Developed	HIC	0.704	0.695	0.683	0.668	0.644	0.664	0.653	0.654	0.660	0.674	0.686	0.685	0.691	0.706	0.724	0.734	0.736	0.662	0.684	**High**	**2**
Italy	Developed	HIC	0.657	0.662	0.672	0.679	0.675	0.681	0.668	0.666	0.661	0.647	0.639	0.632	0.620	0.611	0.604	0.595	0.584	0.496	0.634	**High**	**3**
United Kingdom	Developed	HIC	0.596	0.589	0.574	0.580	0.568	0.565	0.550	0.544	0.541	0.574	0.564	0.557	0.558	0.556	0.551	0.544	0.534	0.483	0.556	**Moderate**	**4**
United States	Developed	HIC	0.499	0.500	0.490	0.485	0.464	0.467	0.454	0.448	0.452	0.451	0.458	0.462	0.471	0.480	0.495	0.504	0.505	0.380	0.469	**Moderate**	**5**
Canada	Developed	HIC	0.464	0.473	0.471	0.462	0.452	0.452	0.441	0.435	0.436	0.452	0.462	0.465	0.470	0.475	0.480	0.482	0.492	0.433	0.460	**Moderate**	**6**
Australia	Developed	HIC	0.337	0.358	0.486	0.489	0.474	0.470	0.469	0.467	0.461	0.467	0.473	0.469	0.471	0.476	0.484	0.492	0.488	0.407	0.455	**Moderate**	**7**
France	Developed	HIC	0.464	0.466	0.467	0.457	0.443	0.440	0.444	0.443	0.444	0.452	0.463	0.462	0.467	0.478	0.478	0.471	0.463	0.384	0.454	**Moderate**	**8**
Russian Federation	Developing	UMIC	0.225	0.254	0.278	0.306	0.329	0.353	0.370	0.389	0.423	0.446	0.471	0.447	0.435	0.438	0.440	0.452	0.454	0.375	0.374	**Moderate**	**9**
Germany	Developed	HIC	0.431	0.423	0.396	0.390	0.386	0.382	0.369	0.366	0.355	0.364	0.369	0.359	0.323	0.323	0.316	0.319	0.328	0.433	0.366	**Moderate**	**10**
Brazil	Developing	UMIC	0.280	0.287	0.286	0.287	0.289	0.296	0.295	0.303	0.312	0.323	0.333	0.325	0.320	0.321	0.327	0.331	0.333	0.302	0.308	**Moderate**	**11**

China	Developing	UMIC	0.229	0.226	0.227	0.221	0.208	0.234	0.244	0.256	0.272	0.288	0.302	0.319	0.326	0.334	0.355	0.366	0.370	0.338	0.279	**Low**	**12**
Turkey	Developing	UMIC	0.177	0.188	0.203	0.222	0.234	0.238	0.246	0.258	0.270	0.291	0.305	0.305	0.306	0.315	0.325	0.329	0.332	0.317	0.265	**Low**	**13**
Saudi Arabia	Developing	HIC	0.153	0.163	0.184	0.212	0.227	0.248	0.247	0.250	0.256	0.260	0.270	0.277	0.273	0.280	0.278	0.283	0.285	0.253	0.241	**Low**	**14**
India	Developing	LMIC	0.149	0.152	0.158	0.166	0.166	0.180	0.194	0.211	0.223	0.239	0.261	0.269	0.281	0.294	0.304	0.320	0.334	0.274	0.224	**Low**	**15**
South Africa	Developing	UMIC	0.151	0.171	0.178	0.173	0.181	0.190	0.202	0.224	0.235	0.245	0.258	0.260	0.251	0.261	0.271	0.280	0.277	0.236	0.221	**Low**	**16**
Argentina	Developing	UMIC	0.129	0.142	0.156	0.169	0.178	0.191	0.203	0.216	0.232	0.239	0.236	0.238	0.241	0.250	0.261	0.266	0.272	0.263	0.211	**Low**	**17**
Mexico	Developing	UMIC	0.144	0.150	0.156	0.166	0.173	0.180	0.187	0.193	0.205	0.210	0.215	0.224	0.227	0.230	0.244	0.260	0.259	0.229	0.200	**Low**	**18**
Indonesia	Developing	LMIC	0.098	0.100	0.104	0.112	0.119	0.129	0.144	0.193	0.229	0.247	0.259	0.262	0.269	0.282	0.277	0.287	0.292	0.291	0.189	**Low**	**19**

Note: The **UMIC** stands for Upper Middle-Income Countries, **LMIC** is for Lower Middle-Income Countries, and **HIC** is the High-Income Countries.

Source: Compiled by the authors

4.1.1 Insights from developed G20 countries

The year-wise Supply-side Financial Inclusion Index (SFII) and its mean values of the G20 countries are given in Table 2, along with the mean ranking and the financial inclusion classification. South Korea, or the Republic of Korea (0.697), achieves the highest SFII rank, followed by Japan (0.684). It is interesting to find that the top two countries on SFII are Asian countries. Specific attributes such as technological prowess and innovation, central planning, strong presence and trust in banking institutions, cultural and demographical homogeneity (Anyangwe et al., 2022) and early interventions such as the implementation of post office banking (Anson et al., 2013; Rillo & Miyamoto, 2016) are the reasons for the advancement on financial inclusion by these two countries.

Conversely, Germany is tenth with the lowest mean score of 0. 366 among the developed G20 countries. The low score of Germany can be associated with various reasons, such as lack of support by governmental agencies, for example, stoppage of micro financial institution programmes, overdependence on banks (Bank credit to the private sector was 103.8% of GDP (versus 52.62% in the United States) in 2011), cash-dominated economy compared to other European countries and low financial literacy (Germann et al., 2019; Neuberger, 2015).

The classification of the countries based on their financial inclusion index values reveals that, among the nine developed G20 countries, only three (South Korea, Japan and Italy) have high financial inclusion levels, and the other countries have moderate financial inclusion levels. Another important finding is that only four countries (South Korea, Japan, Italy and the United Kingdom) among the developed countries scored a mean index value above 0.5. The United States has exhibited financial inclusion index values exceeding 0.5 in specific years; however, its average values remain relatively low. Nevertheless, these nations demonstrate superior financial inclusion scores compared to developing countries.

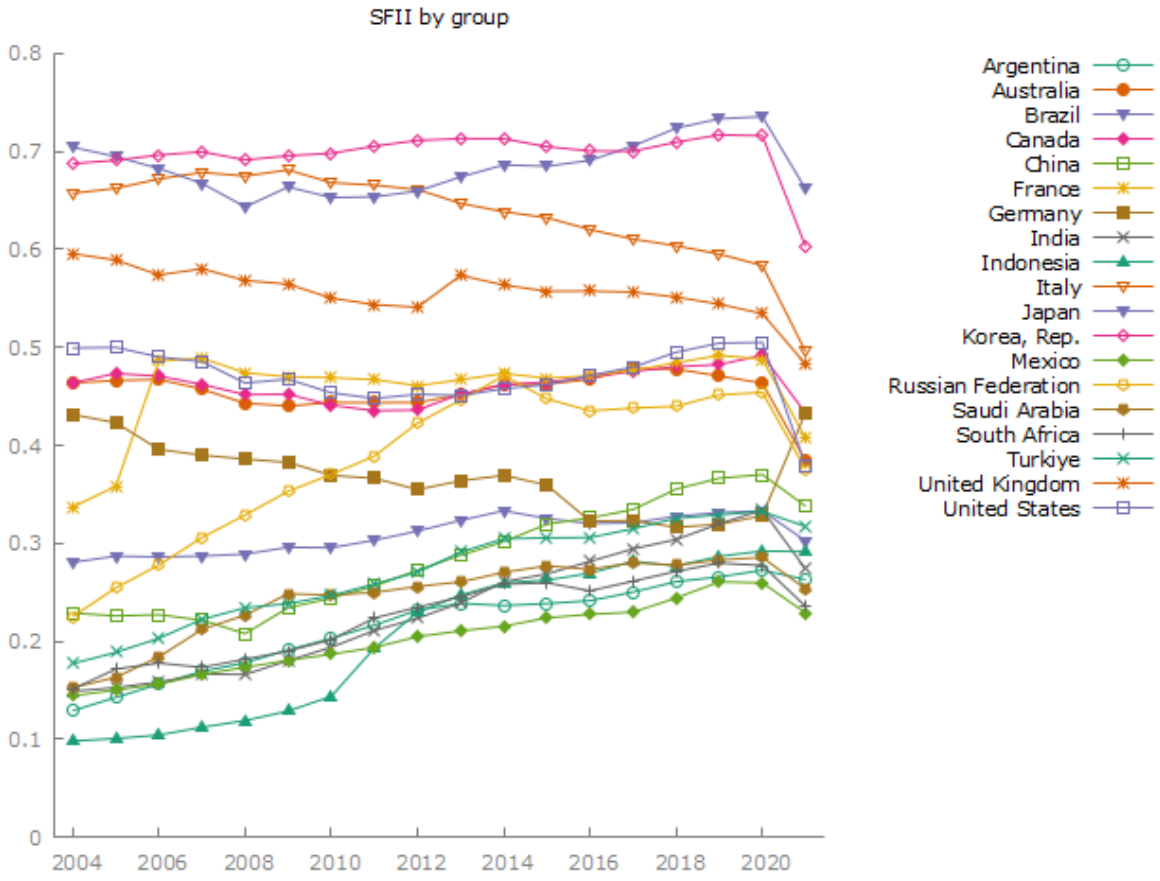

Figure 1: The Supply-side Financial Inclusion Index of the G20 Countries

Figure 1 illustrates that most developed countries in the G20 experienced a decline in 2021, except for Germany. The United Kingdom, Germany and Italy have shown a downward trend, whereas Japan, South Korea, Canada and France have maintained steady values. France had a sudden spike in 2006 from 0.358 to 0.486 and maintained the level till 2020.

3.1.2 Insights from developing G20 countries

Table 2 indicates that Russia ranks highest among the developing countries of the G20, with a mean Financial Inclusion Index score of 0.374, followed by Brazil (0.308) and China (0.279). Only Russia and Brazil have moderate financial inclusion mean scores, and all other developing countries exhibit low financial inclusion as their index values are below 0.3. Notably, Russia surpasses Germany, a developed country, in the overall G20 countries ranking of SFII. This achievement of Russia can be attributed to various reasons, such as governmental and institutional initiatives and monitoring, a fivefold increase in the supply of financial services during 2007-12 and coordinated efforts of the government to improve financial literacy

(BOR, 2021; Gorshkov, 2017; Imaeva et al., 2014). Figure 1 shows Russia's substantial growth from 2004 to 2014, which made it par with a few developed countries like Canada, France, and Australia. However, its growth declined after 2014, attributed to the 2014 Russian economic and currency crisis (Rodionov et al., 2015; Schenkkan, 2015).

Indonesia is the lowest-ranking developing country, followed by Mexico. Indonesia is a country with low financial literacy (49% as of 2022), Geographical barriers (over 273 million people are scattered across thousands of islands), the concentration of financial institutions in few areas (primarily in Java (62.55% of the total), while the remaining are across the country from Sumatra to Papua) are a few reasons for it poor ranking (Business Indonesia, 2022; WEF, 2024).

Despite its high-income status, Saudi Arabia ranks lower than several UMICs, such as Brazil, China, and Turkey. The low performance of Saudi Arabia can be attributed to Saudi's high gender disparity, low-income groups, limited financial literacy, high unemployment rates, and a substantial rural population (Policy Design and Advocacy Program, 2018). In response, Saudi Arabia aims to elevate its financial inclusion to the levels of other high-income countries through initiatives outlined in its Vision 2020 and Vision 2030 plans and the digitalisation of the financial system (Baabdullah et al., 2019; Grand & Wolff, 2020).

Furthermore, it is significant that three upper-middle-income countries (UMICs)—South Africa, Argentina, and Mexico—report lower financial inclusion scores than India, a lower-middle-income country (LMIC). India, an LMIC, outperforms several UMICs, including South Africa, Argentina, and Mexico, in SFII rankings. This achievement is credited to concerted government efforts to enhance financial inclusion, particularly on the supply side. Initiatives such as the Pradhan Mantri Jan Dhan Yojana, the implementation of social banking policies, the introduction of 'Know Your Customer (KYC) ' norms, the establishment of financial literacy centres, the deployment of Business Correspondents (Barik & Sharma, 2019), and the Digital India mission (Chandrasekhar & Ghosh, 2018) have significantly contributed to improving financial inclusion in India. These government actions have successfully enhanced supply-side factors, improving the country's SFII standing.

3.1.3 Insights from Supply-side dimensional indices of the G20 countries

Table 3 provides the dimensional values of the SFII, including index scores and rankings. The data indicate that although certain countries possess higher overall SFII scores, their dimensional scores can vary significantly. Some countries demonstrate strong performance in

access and availability but have lower index scores in other dimensions. For example, the Republic of Korea ranks first in the Access and Availability dimension and third in the Digital dimension with index scores of 0.705 and 0.775, respectively. However, it ranks only sixth in the Usage dimension with a mean index score of 0.5289. Conversely, the United Kingdom ranks first in the Usage and Digital dimensions but only sixth in the Access and Availability dimensions.

Interestingly, countries such as France, Italy, and Russia, with higher overall SFII ranks, display lower ranks in specific dimensions. In contrast, countries like India, China, Saudi Arabia, and the United Kingdom, which have lower overall SFII ranks, achieve higher ranks in specific dimensions. While ranking the lowest among developed nations in the financial inclusion index, Germany secures second in the digital dimension. This strong performance in the digital sector can be attributed to the country's early adoption of digital banking (Neuberger, 2015). In 2013, merely 49% of banking transactions in Germany were conducted through digital channels, which increased to 63% by 2019 (Germann et al., 2019).

For ease of understanding, the countries have been categorised into high, moderate, and low FI based on their dimensional mean index scores. According to Table 4, only three countries—South Korea, Japan, and Italy—have high Access and Availability dimensional values. Seven countries fall into the moderate category with values between 0.3 and 0.6, while eight countries have low dimensional values in these areas. In the Usage dimension, three countries have high FI values, nine have moderate FI values, and seven have low FI values. There are twelve countries with high FI values and six with moderate FI values, and India is the only country with low FI values in the Digital Dimension. Therefore, it is clear that all the G20 countries have better index scores in the digital dimension than the former dimensions.

Table 3 –SFII and its dimensional indices mean

Sl No	Countries	Development Status	Income Status	SFII Score	Rank	D1 Score	Rank	D2 Score	Rank	D3 Score	Rank
1	**Argentina**	Developing	UMIC	0.210	**17**	0.158	**17**	0.105	**19**	0.608	**12**
2	**Australia**	Developed	HI	0.454	**8**	0.397	**8**	0.657	**4**	0.739	**6**
3	**Brazil**	Developing	UMIC	0.307	**11**	0.286	**11**	0.258	**13**	0.527	**13**
4	**Canada**	Developed	HI	0.460	**6**	0.427	**7**	0.556	**5**	0.666	**10**
5	**China**	Developing	UMIC	0.279	**12**	0.163	**15**	0.803	**2**	0.399	**17**
6	**France**	Developed	HI	0.455	**7**	0.454	**5**	0.247	**16**	0.682	**8**

7	**Germany**	Developed	HI	0.366	**10**	0.333	**10**	0.177	**17**	0.791	**2**
8	**India**	Developing	LMIC	0.223	**15**	0.205	**13**	0.373	**8**	0.194	**19**
9	**Indonesia**	Developing	LMIC	0.189	**19**	0.154	**18**	0.249	**15**	0.327	**18**
10	**Italy**	Developed	HI	0.634	**3**	0.647	**3**	0.439	**7**	0.71	**7**
11	**Japan**	Developed	HI	0.684	**2**	0.666	**2**	0.774	**3**	0.764	**5**
12	**Korea**	Developed	HI	0.697	**1**	0.705	**1**	0.529	**6**	0.775	**3**
13	**Mexico**	Developing	UMIC	0.199	**18**	0.173	**14**	0.141	**18**	0.44	**16**
14	**Russia**	Developing	UMIC	0.374	**9**	0.352	**9**	0.254	**14**	0.686	**9**
15	**S. Arabia**	Developing	HI	0.240	**14**	0.159	**16**	0.342	**11**	0.636	**11**
16	**S. Africa**	Developing	UMIC	0.220	**16**	0.152	**19**	0.354	**10**	0.518	**14**
17	**Türkiye**	Developing	UMIC	0.265	**13**	0.228	**12**	0.318	**12**	0.503	**15**
18	**UK**	Developed	HI	0.556	**4**	0.474	**4**	0.922	**1**	0.936	**1**
19	**USA**	Developed	HI	0.469	**5**	0.448	**6**	0.36	**9**	0.774	**4**

Source: Compiled by the author

Figure 2 provides an individual country-wise depiction of SFII and its dimensional values. Figure 2 reveals that in Argentina, Brazil, France, Germany, Russia, Saudi Arabia, Mexico, South Africa, Turkey, and the United States, the values for the digital dimension are significantly higher than those for other dimensions. This indicates that digital financial services are particularly advanced in these countries. It is interesting to note that most of these countries are developing countries. Governments in developing countries are promoting digital payment interfaces such as PIX in Brazil, UPI in India, BI-FAST in Indonesia, and FAST in Turkey, to name a few (GPFI, 2023).

In Australia, Canada, and the United Kingdom, the usage and digital dimensions exhibit higher values than the access and availability dimension. China and India show high values in the usage dimension, likely attributable to their large populations. India is unique in having all its SFII dimensional mean values below the 0.5 threshold.

Conversely, only Japan and South Korea have all their SFII dimensional mean values above 0.5. Regardless of their development status, all other countries have at least one dimension with values below 0.5. This chart is instrumental in identifying specific dimensions where countries are lagging, thereby providing valuable insights for policymakers to implement targeted improvements. The charts provide substantial evidence indicating that countries such as Australia, Canada, Germany, France, Italy, the United Kingdom, and the

United States possess robust supply-side factors and financial infrastructure, as reflected in their high SFII values. Additionally, it is apparent from the charts that most countries have witnessed a decrease in their SFII values during the years 2019, 2020, and 2021. This reduction can be ascribed to the COVID-19 pandemic, which restricted the utilization of financial services due to curfews and lockdowns.

Figure 2: The SFII and its dimensional indices values

4.2 Demand-side Financial Inclusion Index (DFII)

Major Studies in financial inclusion have only focused on the supply side and have not given adequate focus on the demand side of financial inclusion. This lack of attention gives a false impression that countries with more financial services or better financial infrastructure have higher financial inclusion than others. This was because of the lack of data on the demand side of financial inclusion, which was filled out by the World Bank's Global Findex database.

The demand for financial services varies significantly between the developed and developing countries within the G20. The findings highlight several factors influencing financial inclusion within these distinct groups. The results for developed and developing countries have been analysed separately to comprehensively understand the levels of financial

inclusion, allowing for a more nuanced examination of the unique determinants that shape financial inclusion in each context.

Table 4 – Demand-Side Financial Inclusion Index of Developed Countries

Countries	Development Status	Income Status	2011	2014	2017	2021	Mean	FI Status	Overall G20 Rank
Canada	Developed	HIC	0.6143	0.8294	0.8616	0.8522	0.7821	High	1
Australia	Developed	HIC	0.6308	0.7951	0.7959	0.8133	0.7548	High	2
USA	Developed	HIC	0.5808	0.7560	0.7884	0.8025	0.7260	High	3
UK	Developed	HIC	0.5763	0.7737	0.7953	0.7774	0.7246	High	4
Germany	Developed	HIC	0.5997	0.7354	0.7487	0.7635	0.7086	High	5
Korea	Developed	HIC	0.5576	0.7186	0.7590	0.8020	0.7028	High	6
Japan	Developed	HIC	0.5353	0.7419	0.7322	0.7628	0.6863	High	7
France	Developed	HIC	0.5949	0.7038	0.6968	0.7275	0.6788	High	8
Italy	Developed	HIC	0.3853	0.5922	0.6921	0.7288	0.5824	Moderate	9
China	Developing	UMIC	0.3904	0.4971	0.5148	0.6325	0.5014	Moderate	10
Brazil	Developing	UMIC	0.3395	0.4863	0.4544	0.5626	0.4533	Moderate	11
Saudi Arabia	Developing	HIC	0.3204	0.4417	0.4701	0.5839	0.4439	Moderate	12
Turkey	Developing	UMIC	0.3550	0.4133	0.5139	0.4777	0.4356	Moderate	13
Russian	Developing	UMIC	0.3112	0.4387	0.4696	0.5545	0.4342	Moderate	14
South Africa	Developing	UMIC	0.3577	0.4774	0.3829	0.5361	0.4327	Moderate	15
Argentina	Developing	UMIC	0.2468	0.3927	0.3534	0.4489	0.3521	Moderate	16
India	Developing	LMIC	0.2148	0.2777	0.3509	0.3305	0.2884	Low	17
Indonesia	Developing	LMIC	0.1840	0.3175	0.3043	0.3056	0.2715	Low	18
Mexico	Developing	UMIC	0.2190	0.3074	0.2446	0.3273	0.2709	Low	19

4.2.1 Insights on DFII of Developed Countries

Table 4 provides the year-wise DFII values, encompassing the geometric mean of the index values and the corresponding rankings of developed countries in the G20. Canada and Australia occupy the highest ranks, with mean index scores of 0.7821 and 0.7548, respectively. Italy has the lowest ranking, with a mean score of 0.5824. All the developed countries except Italy are classified as high financial inclusion countries with a mean index value above 0.6. The

Global Findex data reports that account ownership in the developed G20 countries is above 97% (for both men and women), but a significant difference can be witnessed in other metrics, such as formal credit and the usage of financial products and services (Demirgüç-Kunt et al., 2022).

Canada's implementation of the Financial Literacy Strategy 2015-2020, coupled with its rapid population growth and the increasing number of newcomers and international students, has significantly amplified the demand for financial services in the country (AFI, 2016; CBA, 2023). Similarly, Australia has pursued the Australian National Financial Literacy Strategy (2011), which aims to enhance the financial literacy of its population, including outreach to immigrant communities. Additionally, Australia's stringent policy requiring the ownership of bank accounts for wage or salary transfers has further driven the demand for financial services. Australia conducts regular surveys to ensure widespread financial literacy and assess the population's essential awareness and understanding of financial services.

In contrast, despite having a high account ownership rate of 97%, Italy exhibits relatively low usage of these financial services compared to other G20 countries. Specifically, formal savings are 49%, formal deposits are 76%, and withdrawals are 86%, whereas the averages for developed G20 nations are 63%, 91%, and 93%, respectively. These figures contribute to Italy's lower ranking in the DFII. Italy's lower demand for financial services than other developed countries is primarily due to cultural preferences for cash transactions, a relatively lower level of financial literacy, and limited trust in financial institutions, resulting in less frequent use of formal financial services despite high account ownership.

4.2.2 Insights on DFII of Developing countries

Table 4 shows that China occupies the first rank with a mean index score of 0.5014 among the developing countries, followed by Brazil (0.4533). China is the only developing country with an index score above 0.5. All the other developing countries of the G20 are below 0.5. China's success in achieving a better DFII score compared to other developing countries can be attributed to a combination of policy initiatives (Allen, 2019), technological advancements (Liu et al., 2021), the development of a robust financial infrastructure (World Bank, 2018) and rapid adoption of digital financial services (Yang & Zhang, 2022). However, there is criticism that China's financial sector is lagging in its overall economic growth and development (Allen et al., 2017).

Mexico (0.2709) and Indonesia (0.2715) have the lowest DFII mean scores, respectively. Despite Mexico's status as a UMIC, it ranks below two LMICs - India and Indonesia. According to Belmont (2021), account ownership and the frequency of making or receiving digital payments are significantly lower in Mexico compared to peer countries. The report says that financial access gaps by gender, region, and urban-rural setting are also considerably larger in Mexico than in the Latin America and Caribbean region and OECD countries (Belmont, 2021). The World Bank reports that access to finance was deficient in Mexico's central, southern, and eastern parts and among certain marginalized groups, such as women (World Bank, 2021). Indonesia's low DFII score is attributed to its people's low participation in formal financial activities. In the case of Indonesia, A recent study by Indonesia's Ministry of Cooperatives revealed that over half of surveyed ultra-micro and micro-businesses remain financially underserved, lacking bank accounts, being in debt, and transacting mainly in cash, which hampers their ability to establish a legitimate credit history and access formal funding (WEF, 2022).

Seven countries (China, Brazil, Saudi Arabia, Turkey, Russia, South Africa and Argentina) are moderate financial inclusion countries, and three (India, Indonesia and Mexico) are classified as low financial inclusion countries.

The developing countries, with the help of other developed countries and organizational funding sources, contribute to improving their financial inclusion levels, but these efforts are often unsuccessful due to their low human development and persistent high illiteracy rate (Arora, 2012). Out of the total unbanked population in the world, 33% of the people live in 3 developing countries of the G20 - China (9%), India (17%), and Indonesia (7%) (Demirgüç-Kunt et al., 2022). Most developing countries had their financial reforms in the 80s and 90s, unlike the developed countries, which is also a reason for their low financial inclusion levels. The presence of a robust informal financial sector also creates a significant setback for the demand for formal financial services. Various barriers to accessing formal financial services in developing countries, such as distance, lack of documentation, cultural and religious restrictions, income, and other voluntary and involuntary barriers, make formal financial services inaccessible and lead the way to informal services. It is also a reason for the low demand for formal financial services in developing countries.

Another important reason for the low demand is the demographics. Unlike developed countries, developing countries have a high population but limited resources. Therefore, formal

financial institutions offer their services to highly credible and trustworthy people. Even though there has been a drastic improvement in account ownership in developing countries, especially India and China, other financial indicators are lagging, such as credit (Demirgüç-Kunt et al., 2022).

Figure 3 provides a comprehensive overview, indicating that most developed nations possess DFII values exceeding 0.5, with a marked increase observed between 2011 and 2014, followed by a stabilization period. Italy stands out with a remarkable rise in its DFII value, ascending from 0.38 to 0.72. The DFII values demonstrate a distinct pattern of clustering, wherein developed countries form one cluster and developing countries form another, underscoring a clear division between these groups. Additionally, the figure highlights that all developing nations, except Turkey, India, and Indonesia, exhibit substantial growth in their DFII values. This trend suggests an improvement in the demand side of financial inclusion, driven by the expansion of financial infrastructure, mainly digital financial services. The results imply that with the implementation of sustainable policy measures, these developing countries have the potential to achieve high levels of financial inclusion within a relatively short timeframe. Conversely, Turkey, India, and Indonesia emerge as outliers, displaying a declining trend in their DFII values.

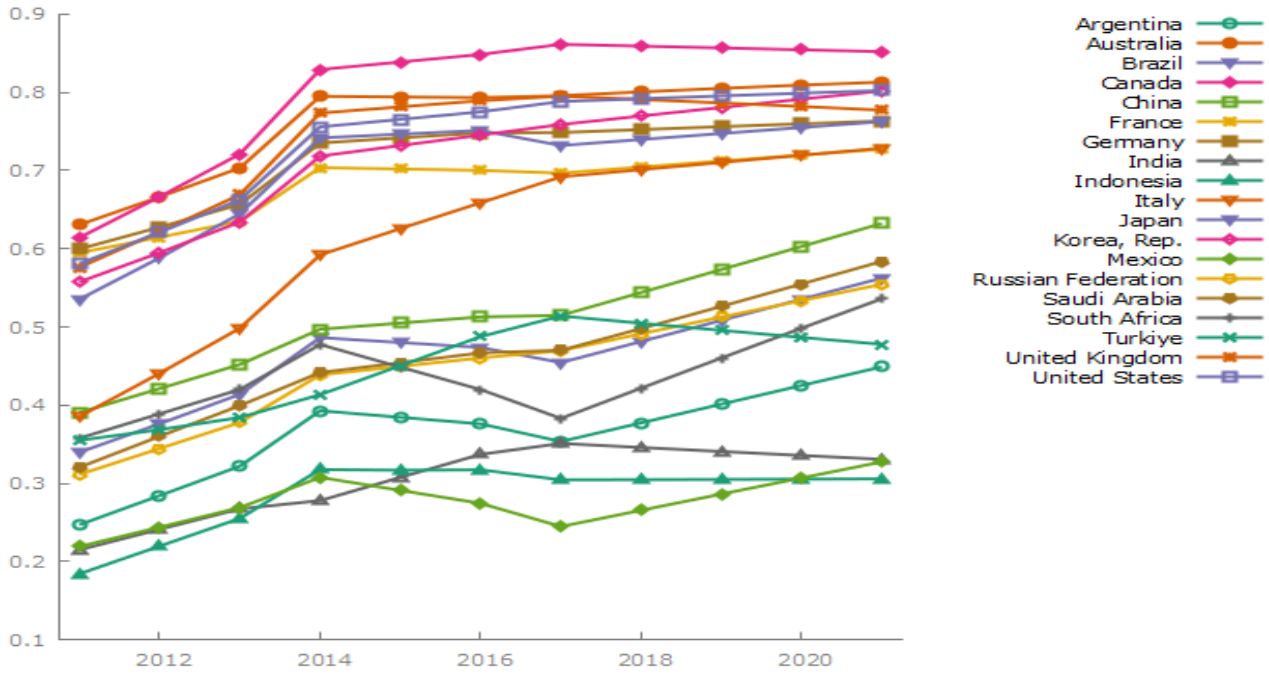

Figure 3: DFII values of G20 Countries

3.3 Insights on Demand-side Dimensional indices of the G20 countries

Table 5 provides a detailed overview of the mean values of the dimensional indices and the corresponding country-specific rankings within the Deman-side Financial Inclusion Index (DFII). The data reveal a distinct division between developed and developing countries; however, deviations from the overall rankings are evident when specific dimensions are considered. Notably, Canada, which ranks highest among the developed countries in the overall DFII, also leads in the access and availability and digital dimensions. Nevertheless, it ranks second in the usage dimension, with Australia, which is second overall, emerging as the leader in this particular dimension. This pattern of variation is observed across most countries included in the study.

For instance, China, the top-ranked developing country, holds an overall DFII rank of 10. However, its rank drops to 13 in the access and availability dimension and 11 in the usage dimension. On the other end of the spectrum, Mexico, the lowest-ranked country in the DFII among G20 countries with an overall rank of 19, ranks 17 in the access and availability dimension and usage dimension, surpassing India and Indonesia by two places.

These findings indicate that countries may exhibit stronger or weaker performance in specific dimensions, but their overall DFII ranking may not fully capture these nuances. Identifying the strengths and weaknesses of countries across various dimensions provides valuable insights into the areas where they excel and those where they lag. Policymakers can leverage this information to design targeted strategies, focusing on dimensions that require greater attention and improvement.

Table 5 – DFII and the dimensional indices mean values

Sl No	Countries	Development Status	Income Status	DFII	Rank	D1	Rank	D2	Rank	D3	Rank
1	**Argentina**	Developing	UMIC	0.3145	16	0.5886	14	0.3788	16	0.3145	16
2	**Australia**	Developed	HI	0.7432	2	0.9381	2	0.8591	1	0.7432	2
3	**Brazil**	Developing	UMIC	0.4272	11	0.6382	10	0.5176	14	0.4272	11
4	**Canada**	Developed	HI	0.7764	1	0.9605	1	0.8578	2	0.7764	1
5	**China**	Developing	UMIC	0.4860	10	0.6036	13	0.5765	11	0.4860	10
6	**France**	Developed	HI	0.6626	8	0.8507	7	0.7819	6	0.6626	8
7	**Germany**	Developed	HI	0.6995	5	0.8700	6	0.7730	7	0.6995	5
8	**India**	Developing	LMIC	0.2768	17	0.3128	19	0.2456	19	0.2768	17
9	**Indonesia**	Developing	LMIC	0.2402	18	0.4072	18	0.2564	18	0.2402	18
10	**Italy**	Developed	HI	0.5587	9	0.7900	9	0.7402	8	0.5587	9
11	**Japan**	Developed	HI	0.6892	7	0.8177	8	0.6597	9	0.6892	7

12	**Korea**	Developed	HI	0.6896	6	0.8810	5	0.8029	5	0.6896	6
13	**Mexico**	Developing	UMIC	0.2329	19	0.4550	17	0.3046	17	0.2329	19
14	**Russia**	Developing	UMIC	0.3983	15	0.6254	12	0.6261	10	0.3983	15
15	**S. Arabia**	Developing	HI	0.4159	12	0.6313	11	0.5322	13	0.4159	12
16	**S. Africa**	Developing	UMIC	0.4054	14	0.5714	15	0.5581	12	0.4054	14
17	**Türkiye**	Developing	UMIC	0.4138	13	0.5666	16	0.5029	15	0.4138	13
18	**UK**	Developed	HI	0.7135	4	0.9163	3	0.8100	4	0.7135	4
19	**USA**	Developed	HI	0.7141	3	0.9076	4	0.8166	3	0.7141	3

The findings further indicate that countries generally achieve higher index scores in the access and availability dimension than other dimensions of the DFII. For example, Argentina records an index score of 0.5886 for the access and availability dimension, which surpasses its scores in the other DFII dimensions. This elevated performance in access and availability can be attributed to concerted efforts by G20 countries to enhance the accessibility and availability of formal financial services for nearly all citizens. Empirical evidence supports this progress, showing that formal account ownership in G20 countries increased from 51% in 2011 to 76% in 2021, reflecting more than 50% growth (Demirgüç-Kunt et al., 2022). As of 2021, 87% of individuals in G20 countries hold formal financial accounts (GFD, 2021). These data underscore the substantial advancements made by countries in improving financial service accessibility, which is reflected in the relatively high index scores for the access and availability dimension compared to other dimensions.

For the usage and digital dimension, it is found that certain countries like India and Japan have better digital dimension scores than the usage dimension. India is one of the largest and fastest-growing markets for digital services, presenting the country with an opportunity to transform financial inclusion through digital financial services (Duvendack et al., 2023; Maiti et al., 2020). It has witnessed massive changes in digital banking and infrastructure (Barik & Sharma, 2019). There are three reasons for India's high demand for digital financial services. First, the demonetisation in 2014 invalidated 86.9% of currency in circulation, making it the most impactful measure that pushed digital finance (RBI, 2017). Second, the Unified Payments Interface (UPI) developed by the government enabled anyone with a mobile and bank account transact money to another person without any need to keep cash at hand. Third, the JAM (Jan Dhan – Aadhar - Mobile) programme which enabled national biometrics digital identity programme, provides every Indian with a unique digital identity and a bank account linking them with a mobile phone (Barik & Sharma, 2019; Kumar & Pathak, 2022). Japan's strong

demand for digital financial services over traditional financial services is primarily driven by its advanced technological infrastructure, high smartphone penetration, and the population's growing preference for convenience and efficiency in financial transactions.

Within the DFII, Canada and Australia consistently rank highest across all dimensions. Conversely, Italy and Japan rank lowest among developed countries in the access and availability and usage dimensions, with France ranking lowest in the digital dimension. Among developing countries, Brazil leads in the access and availability dimension, followed by Saudi Arabia, while India ranks lowest in this category. Russia ranks highest in the usage dimension, followed by China, with India and Indonesia occupying the lowest ranks. In the digital dimension, China is the top performer among developing countries, followed by Brazil, while Mexico and Indonesia rank the lowest.

4.3 Consolidated Financial Inclusion Index (CFII):

The Consolidated Financial Inclusion Index (CFII) is an integrated metric derived from supply- and demand-side indicators. The calculation of the CFII spans the period from 2011 to 2021. Notably, some countries exhibit higher scores in the Supply-Side Financial Inclusion Index (SFII) or the Demand-Side Financial Inclusion Index (DFII). The CFII facilitates a comprehensive understanding of the combined index score, recognizing that financial inclusion encompasses both supply-side and demand-side elements. Analysing the CFII enables an accurate assessment of a country's overall financial inclusion. The CFII values are enumerated in Table 6, with their graphical representation depicted in Figure 4.

South Korea (Republic of Korea) ranks highest in the CFII mean ranking, boasting an average index value of 0.7129. As anticipated, all the High-Income Countries (HICs) occupy the upper echelons of the ranking. Germany, with a mean score of 0.5257, is the lowest-ranking developed nation in this index. Among the developing countries of the G20, Russia holds the highest position. Conversely, Mexico is the lowest-ranking nation within this group, with a mean index score of 0.239. The classification based on financial inclusion scores reveals that three countries—the United Kingdom, Korea, and Japan—are categorized as high financial inclusion nations. Twelve countries fall into the moderate financial inclusion category: Canada, France, Australia, Germany, the United States, Italy, China, Saudi Arabia, Brazil, Turkey, Russia, and South Africa. Four countries—Argentina, India, Indonesia, and Mexico—are classified as low financial inclusion nations. The CFII values substantiate that a country's level of development and income significantly influence its financial inclusion status.

Table 6 – Consolidated Financial Inclusion Index

Countries	Development Status	Income Status	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Mean	FI Status	Rank
Korea	Developed	HIC	0.6364	0.6585	0.6786	0.7186	0.7209	0.7249	0.7316	0.7417	0.7509	0.7561	0.7349	0.7129	**High**	**1**
Japan	Developed	HIC	0.573	0.6005	0.6333	0.6866	0.6882	0.6927	0.6906	0.702	0.7088	0.7167	0.6822	0.6688	**High**	**2**
United Kingdom	Developed	HIC	0.5397	0.5581	0.5954	0.6449	0.6458	0.6487	0.6516	0.6462	0.6406	0.6343	0.6066	0.618	**High**	**3**
Canada	Developed	HIC	0.4927	0.5132	0.5408	0.5981	0.6025	0.6078	0.6174	0.6191	0.6190	0.6236	0.6045	0.5835	**Moderate**	**4**
Italy	Developed	HIC	0.4979	0.5215	0.5407	0.5801	0.5944	0.6050	0.6173	0.6190	0.6193	0.6254	0.5828	0.5806	**Moderate**	**5**
Australia	Developed	HIC	0.5053	0.5183	0.5343	0.5855	0.5847	0.586	0.5939	0.5959	0.595	0.5969	0.571	0.5688	**Moderate**	**6**
United States	Developed	HIC	0.4846	0.5036	0.5200	0.5717	0.5767	0.5838	0.5939	0.6016	0.6069	0.6125	0.5833	0.5655	**Moderate**	**7**
France	Developed	HIC	0.5066	0.5117	0.5226	0.5635	0.5604	0.5600	0.5611	0.5675	0.574	0.5813	0.5511	0.5503	**Moderate**	**8**
Germany	Developed	HIC	0.4769	0.4823	0.4982	0.5459	0.5461	0.5290	0.5317	0.5301	0.5333	0.5307	0.5873	0.5257	**Moderate**	**9**
Russian Federation	Developing	UMIC	0.3275	0.3589	0.3845	0.4263	0.4208	0.4203	0.4267	0.4378	0.4536	0.4675	0.4562	0.4142	**Moderate**	**10**
China	Developing	UMIC	0.3059	0.3281	0.3503	0.3846	0.3982	0.4054	0.4109	0.4353	0.4540	0.4702	0.4712	0.3976	**Moderate**	**11**
Brazil	Developing	UMIC	0.3032	0.3250	0.3480	0.3936	0.3873	0.3817	0.3727	0.3892	0.4042	0.4208	0.4142	0.3746	**Moderate**	**12**
Türkiye	Developing	UMIC	0.2952	0.3060	0.3224	0.3466	0.3666	0.3855	0.4038	0.4036	0.4002	0.3988	0.3778	0.3621	**Moderate**	**13**
Saudi Arabia	Developing	HIC	0.2676	0.2899	0.3116	0.3422	0.3523	0.3573	0.3631	0.3758	0.3917	0.4071	0.4125	0.3490	**Moderate**	**14**
South Africa	Developing	UMIC	0.2766	0.2963	0.3162	0.3571	0.3435	0.3253	0.3107	0.3349	0.3583	0.378	0.3828	0.333	**Moderate**	**15**

Argentina	Developing	UMIC	0.2169	0.2420	0.2639	0.3035	0.2997	0.2960	0.2886	0.3057	0.3198	0.3363	0.3368	0.2894	**Low**	**16**
India	Developing	LMIC	0.2019	0.2202	0.2399	0.2572	0.2764	0.2978	0.3119	0.3126	0.3159	0.3214	0.3013	0.2748	**Low**	**17**
Indonesia	Developing	LMIC	0.1783	0.2135	0.2385	0.2777	0.2782	0.2807	0.2807	0.2782	0.2823	0.2864	0.272	0.2581	**Low**	**18**
Mexico	Developing	UMIC	0.1954	0.2126	0.2274	0.2516	0.2464	0.2396	0.2252	0.2418	0.2601	0.2717	0.2687	0.239	**Low**	**19**

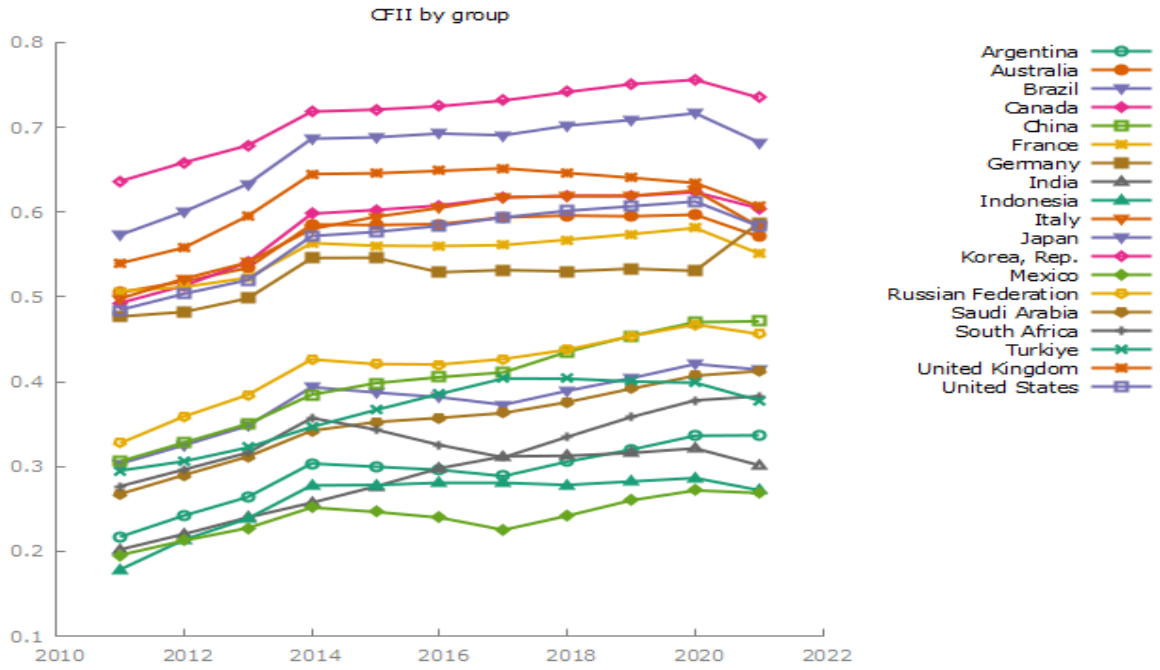

Figure 5: CFII values of G20 Countries

Figure 5 illustrates a pronounced disparity in financial inclusion between developed and developing countries. All developed nations exhibit values exceeding 0.45, while the developing countries have values below this threshold. This figure demonstrates a clustering of countries based on their level of development and income. Notably, it is observed that while the values for developed countries appear to have reached a saturation point, the values for developing countries are progressively increasing.

Table 7 presents the Consolidated Financial Inclusion Index (CFII) dimensional mean index values and their corresponding ranks. Countries exhibit varied values and rankings across different dimensions. Developed High-Income countries generally achieve superior

dimensional index scores and rankings across all dimensions. Conversely, LMICs in India and Indonesia rank lowest across all dimensions.

Among the UMICs, Mexico and Argentina occupy the lowest rankings, particularly in access, availability, and usage dimensions. South Korea ranks first in the access and availability dimension and second in the digital dimension, but it is only sixth in the usage dimension. Japan ranks second in both the access and availability and usage dimensions, yet it ranks sixth in the digital dimension. The United Kingdom ranks first in the usage and digital dimensions, with mean dimensional values of 0.8786 and 0.8663, respectively. These findings highlight the specific dimensions in which countries should concentrate their efforts to enhance financial inclusion policies.

Table 7 – CFII and the dimensional indices mean values

Sl No	Countries	Development Status	Income Status	CFII	Rank	D1	Rank	D2	Rank	D3	Rank
1	**Argentina**	Developing	UMIC	0.289	**16**	0.219	**17**	0.3563	**17**	0.5877	**13**
2	**Australia**	Developed	HI	0.569	**6**	0.5288	**8**	0.7603	**3**	0.7399	**3**
3	**Brazil**	Developing	UMIC	0.375	**12**	0.3301	**11**	0.4481	**15**	0.5783	**14**
4	**Canada**	Developed	HI	0.584	**4**	0.5561	**5**	0.7317	**4**	0.7054	**8**
5	**China**	Developing	UMIC	0.398	**11**	0.3280	**12**	0.6921	**5**	0.5481	**15**
6	**France**	Developed	HI	0.55	**8**	0.5368	**7**	0.5178	**9**	0.7030	**10**
7	**Germany**	Developed	HI	0.526	**9**	0.5046	**9**	0.4823	**11**	0.7388	**4**
8	**India**	Developing	LMIC	0.275	**17**	0.2384	**16**	0.3677	**16**	0.3050	**19**
9	**Indonesia**	Developing	LMIC	0.258	**18**	0.2034	**18**	0.3453	**18**	0.4111	**18**
10	**Italy**	Developed	HI	0.581	**5**	0.5711	**3**	0.5883	**7**	0.7046	**9**
11	**Japan**	Developed	HI	0.669	**2**	0.6619	**2**	0.7802	**2**	0.7122	**6**
12	**Korea**	Developed	HI	0.713	**1**	0.7268	**1**	0.6736	**6**	0.7548	**2**
13	**Mexico**	Developing	UMIC	0.239	**19**	0.1775	**19**	0.3213	**19**	0.4471	**17**
14	**Russia**	Developing	UMIC	0.414	**10**	0.3685	**10**	0.4516	**14**	0.7104	**7**
15	**S. Arabia**	Developing	HI	0.349	**14**	0.2761	**14**	0.4906	**10**	0.6652	**11**
16	**S. Africa**	Developing	UMIC	0.333	**15**	0.2686	**15**	0.4561	**13**	0.6099	**12**
17	**Türkiye**	Developing	UMIC	0.362	**13**	0.3155	**13**	0.4697	**12**	0.5333	**16**
18	**UK**	Developed	HI	0.618	**3**	0.5698	**4**	0.8786	**1**	0.8663	**1**
19	**USA**	Developed	HI	0.566	**7**	0.5468	**6**	0.5827	**8**	0.7356	**5**

Figure 6 provides a graphical representation of the Consolidated Financial Inclusion Index (CFII) and its dimensional values. The chart indicates that developed countries consistently achieve dimensional values exceeding 0.5 across all dimensions. In contrast,

developing countries generally attain values above 0.5 only in the usage and digital dimensions. This trend is particularly noticeable in countries such as Argentina, Brazil, Russia, Saudi Arabia, South Africa, and Turkey. The disparity is primarily attributed to the insufficient infrastructure to access and avail necessary financial services in these developing nations.

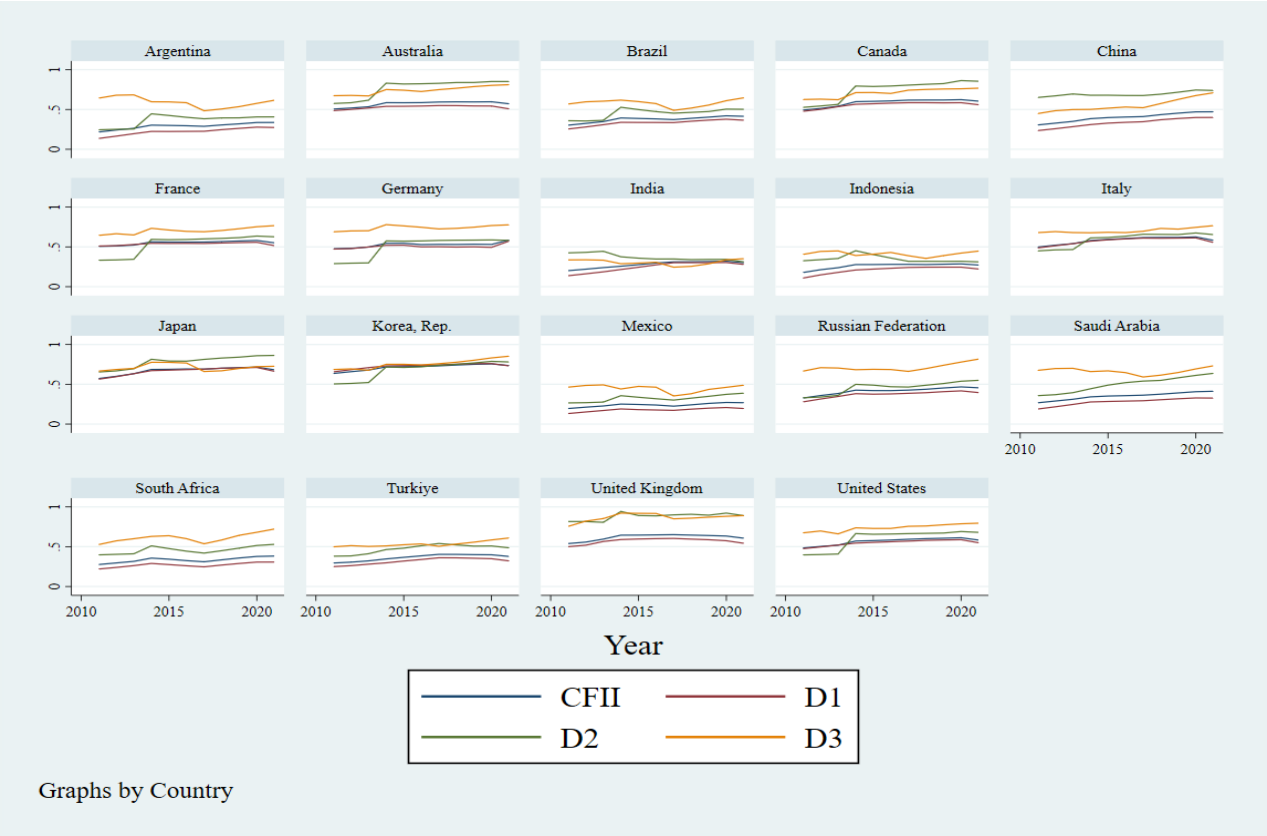

Figure 6: Country-wise CFII and its dimensional values

4.3.1 Country-wise Comparative Analysis of the Indices

Upon conducting a comprehensive analysis of the G20 nations, it has been observed that a significant number of countries, regardless of their level of development, exhibit elevated DFII scores in contrast to their SFII scores. Developed countries such as Australia, Canada, France, Germany, the United States, and the United Kingdom demonstrate significant discrepancies between their DFII and SFII values, as illustrated in Figure 7. Among these nations, only those with advanced financial inclusion, exemplified by Japan and South Korea, achieve indices values exceeding 0.6 across all three measures. Conversely, countries with the lowest levels of financial inclusion, including Argentina, India, Mexico, and Indonesia, consistently record indices values below 0.4.

The charts provide substantial evidence indicating that countries such as Australia, Canada, Germany, France, Italy, the United Kingdom, and the United States possess robust supply-side factors and financial infrastructure, as reflected in their high SFII (Socio-economic Financial Inclusion Index) values. Consequently, these nations should prioritize enhancing demand-side factors by expanding the user base by providing formal financial accounts and offering credit and savings facilities, thereby bolstering the demand side of financial inclusion.

Moreover, the data reveal that Italy, despite previously having a high DFII score, has experienced a decline in recent years. This decline is attributed to the insufficient sustainable demand for financial services. Additionally, it is apparent from the charts that most countries have witnessed a decrease in their SFII values during the years 2019, 2020, and 2021. This reduction can be ascribed to the COVID-19 pandemic, which restricted the utilization of financial services due to curfews and lockdowns. Conversely, the DFII has remained unaffected by the pandemic, displaying a consistent rise in recent years. This trend can be attributed to the increasing reliance on formal financial services as people sought secure financial solutions amidst economic uncertainties.

For developing countries, there is an urgent need to improve supply- and demand-side factors, as evidenced by the low values in both indices. Although the DFII demonstrates steady growth in these regions, the declining SFII necessitates careful attention. Investment in financial infrastructure is crucial for these countries to enhance their overall financial inclusion. Countries such as Brazil, China, and South Africa experienced a downturn in their DFII in 2016 and 2017 but have since recovered and demonstrated steady growth.

The figure illustrates digital financial inclusion, representing the digital dimension of the Comprehensive Financial Inclusion Index (CFII). The charts indicate that digital financial inclusion surpasses all primary indices across most countries except India. Traditional methods of financial inclusion are costly and inaccessible, whereas digital means have proven effective in integrating previously excluded populations into financial services. This success is primarily attributed to the cost-effectiveness and widespread accessibility of digital financial services via the internet.

All countries have implemented policies to enhance digital financial inclusion, which has become a crucial policy agenda under the G20's Global Partnership for Financial Inclusion (GPFI). The GPFI's recent release of the G20 Financial Inclusion Action Plan 2023 highlights the significance of "Digital Financial Inclusion (DFI)." The plan defines DFI as promoting

secure and responsible digitally-enabled financial services and products in G20 and non-G20 countries. This initiative aims to provide financially excluded and underserved populations with a range of formal financial services tailored to their needs and delivered responsibly, ensuring adequate access at an affordable cost for customers and sustainability for providers. Additionally, the GPFI has published the 'Implementation Guide for the G20 High-Level Principles for Digital Financial Inclusion.' This report underscores the pivotal role of digital financial services in advancing financial inclusion, suggesting that digital strategies are the optimal path forward for achieving comprehensive financial inclusion.

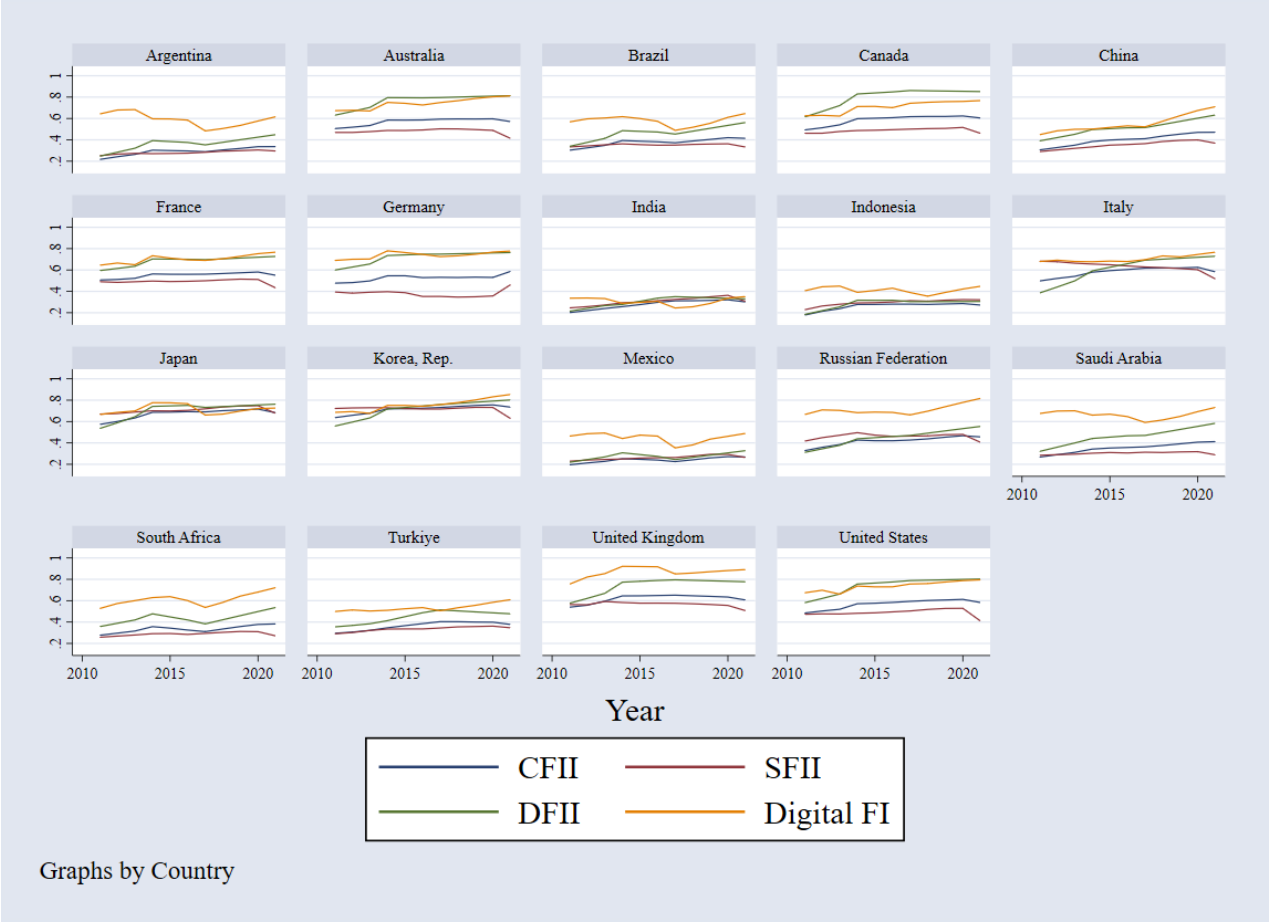

Figure 7: Country-wise depiction of the indices

5. Conclusion

The study developed a comprehensive financial inclusion index using the available supply and demand side financial inclusion indicators. Three primary indices are developed – Supply-side Financial Inclusion Index (SFII), Demand-side Financial Inclusion Index (DFII) and Consolidated Financial Inclusion Index (CFII). To comprehend these indices, dimensional indices are developed for each primary indices: access and availability, usage, and digital. The

study's results prove that a country's development and income status significantly influence financial inclusion. Nations with high levels of financial inclusion have better incomes and are advanced economically, and vice versa. Financial inclusion is a conglomeration of the demand and supply of financial services. A country is said to have financial inclusion levels when adequate demand and supply side factors exist. The study also found that the demand and supply side and dimensional indices vary based on the country's development and income status. Therefore, it can be concluded that the development and income of a country positively impact financial inclusion. This finding also underlines the inherent endogeneity between financial inclusion and economic growth and development. It can be summarised that economic growth is a significant determinant of financial inclusion and vice versa.

The study also found that countries that rank high in the index ranking lag in specific dimensions where the countries need to improve, and countries having good supply-side factors lack demand-side factors and vice versa. Only a few countries of the G20 manage to balance both to have an optimum financial inclusion level. While considering the supply-side factors, there exists a supply-side digital and accessibility divide among the countries since developed countries have high values in these dimensions, whereas developing countries have lower dimensional values. However, the usage is almost similar for both. Policymakers of developing countries should focus more on giving access to the people who need financial services and developing the infrastructure, especially for digital financial services, as studies have proved that the fastest way to achieve high FI is through digital financial inclusion. Lower and middle-income countries should focus more on the supply side needs of the people, which can help the individuals access and avail of necessary financial services and enable digital facilities for financial inclusion as studies are proving financial inclusion is more beneficial to lower-income countries than high-income countries (Loukoianova et al., 2018).

While considering the demand-side factors, it was found that developed HICs have better DFII values than UMICs and LMICs. Developing countries with upper and lower incomes have higher usage and digital dimensional values than the access and availability index values, meaning developing countries have to improve in giving access to and availing financial services. Developed economies should focus more on the digital front, which has a tremendous opportunity but lags behind other emerging countries. The statistical tests confirm these results, proving the difference statistically significant. The results show that certain countries perform well in specific dimensions and lower in others. Therefore, countries should focus more on improving their DFII values by taking appropriate policy measures to bring more people into

using formal financial services, especially in those dimensions with fewer DFII scores. The CFII brings out the complete picture of the FI in the countries by balancing the SFII and DFII. Only when there is sufficient supply-side and demand-side FI factors can it be said that financial inclusion is at the ideal level.

The literature indicates that developed nations, characterized by advanced financial infrastructure and ease of accessibility, exhibit a higher demand for formal financial services than their developing counterparts. Consequently, enhancing the financial infrastructure, or the supply side, is imperative to stimulate demand for financial services. Inadequate supply infrastructure can stifle the demand for these services. Additionally, the development of innovative and attractive financial products is essential to encourage the use of formal financial services, mainly through digital platforms. Technological advancements have made financial services accessible, such as the widespread adoption of the United Payments Interface (UPI) in India, PayID in Australia, PromptPay in Thailand, Pix in Brazil, and Swish in Sweden. These cases illustrate how innovative digital financial services gain rapid acceptance compared to traditional offerings. Policymakers, especially in developing countries, must ensure that the financial services provided are affordable and accessible, fostering an environment where everyone can utilize these services equally.

The government has a critical role in promoting formal financial services by fostering financial literacy and education. This objective can be achieved by integrating financial education into curricula within educational institutions, community programs, and other public platforms, where individuals can be trained to utilize financial services responsibly and effectively. The absence of financial literacy represents a significant barrier to the widespread adoption of financial services. Therefore, it is incumbent upon policymakers to ensure that comprehensive financial awareness is disseminated across all segments of society. To this end, well-designed initiatives should be developed, potentially in collaboration with private sector partners, under the careful oversight of governmental authorities to ensure their efficacy and inclusivity.

Overall, the conclusion is that countries should focus on providing valuable and affordable financial services and attractive financial products primarily for the disadvantaged and excluded people and improving the digital financial infrastructure. Considering the impact of income on the financial inclusion of the countries, policymakers should focus on the overall development of the country, which will eventually bring higher financial inclusion.

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